

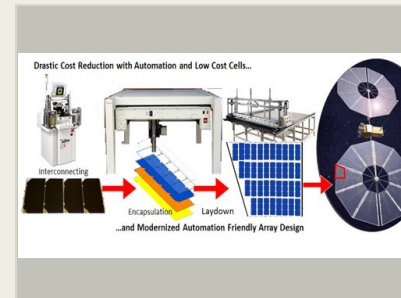
Low Cost Automated Manufacture of PV Array Technology (P-NASA12-007-1), Phase II

Completed Technology Project (2014 - 2016)



Project Introduction

Spacecraft for NASA, DoD and commercial missions need higher power than ever before, with lower mass, compact stowage, and lower cost. While high efficiency, space-qualified solar cells are in themselves costly, integrating them into a high performance Photovoltaic Assembly (PVA) using conventional glassing, interconnecting, stringing, tiling and laydown techniques can double their cost in \$/Watt. The cost of solar power could be significantly reduced if the design of the Photovoltaic Assembly could be modified, modularized and standardized to be compatible with automated electronic assembly and terrestrial solar panel manufacturing methods. Additional benefits of such an approach include higher quality and consistency, improved qualification traceability, and robustness on thin flexible as well as rigid arrays. During the Phase I effort Vanguard successfully demonstrated automated pick-and-place, electrical interconnection, and adhesive dispensing adapted to our lightweight flexible Thin Integrated Solar (THINS) PVA. THINS uses multi-cell covers and advanced interconnection and encapsulation technology, which enables automated integration of traditional and advanced space qualified solar cells. Engineering economic analysis showed the potential for >30% PVA \$/Watt cost reduction, while the encapsulation approach associated with THINS showed enhanced durability in space environments, even at high voltages and extreme thermal cycle environments. During the Phase II Program we will further enhance our automated sub-module manufacturing, and scale the approach to the module level. Automated assembly scale up will be performed while integrating into an existing deployable space structure platform, enhancing the TRL of a high performance high power application of automated cell integration scalable from tens to hundreds of kilowatts, and providing a credible commercialization path, all while reducing solar array costs by more than \$150/W.



Low Cost Automated Manufacture of PV Array Technology (P-NASA12-007-1), Phase II

Table of Contents

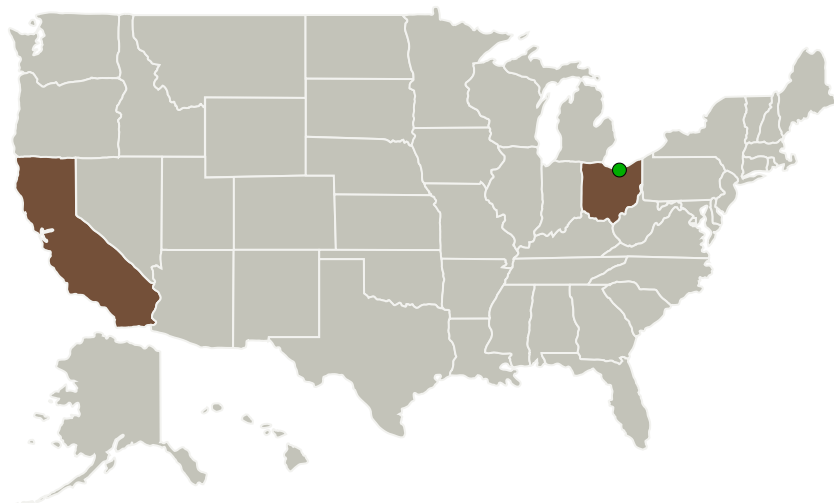
Project Introduction	1
Primary U.S. Work Locations and Key Partners	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Images	3
Technology Areas	3
Target Destinations	3

Low Cost Automated Manufacture of PV Array Technology (P-NASA12-007-1), Phase II

Completed Technology Project (2014 - 2016)



Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Vanguard Space Technologies, Inc	Lead Organization	Industry	San Diego, California
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations

California	Ohio
------------	------

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Vanguard Space Technologies, Inc

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

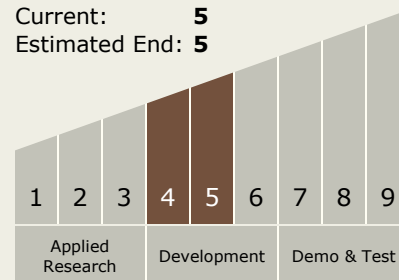
Nicholas Walmsley

Technology Maturity (TRL)

Start: 4

Current: 5

Estimated End: 5

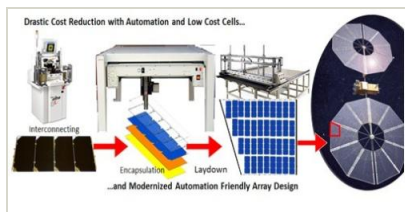


Low Cost Automated Manufacture of PV Array Technology (P-NASA12-007-1), Phase II

Completed Technology Project (2014 - 2016)



Images



Briefing Chart Image

Low Cost Automated Manufacture of PV Array Technology (P-NASA12-007-1), Phase II
(<https://techport.nasa.gov/image/136958>)

Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
 - └ TX03.1 Power Generation and Energy Conversion
 - └ TX03.1.1 Photovoltaic

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System